Greetings and welcome to the **MARCH 2014** edition of the WDFW Climate News Digest. The purpose of this digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site -- http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/default.aspx and also on the agency website.

Thanks for contributions this month from Marc Hayes, Dale Gombert, David Patte (USFWS) and Ellie Cohen (Point Blue Conservation)

WHAT'S HAPPENING AT WDFW?

Implementing the National Fish, Wildlife and Plants Climate Adaptation Strategy
The National Fish, Wildlife and Plants Climate Adaptation Strategy (or NFWPCAS) was completed last year, under the leadership of the U.S. Fish and Wildlife Service (Service), along with the National Oceanic and Atmospheric Administration (NOAA, Department of Commerce) and with the participation of State, and tribal partners. The purpose of the Strategy is to inspire and enable natural resource professionals and other decision makers to take action to conserve the nation's fish, wildlife, plants, and ecosystem functions, as well as the human uses and values these natural systems provide, in a changing climate.

Agencies at all levels of government are now working collaboratively through an interagency Working Group to oversee implementation of the *Strategy*, and act as a forum for coordination between federal, state, and tribal agencies and other stakeholders. Cynthia Wilkerson (Wildlife Program) sits on this National Working Group and will be coordinating a workshop to brief all the major players in Washington state agencies regarding the Strategy, and to strategize how to incorporate the key recommendations into our work. A date has not yet been set, but the workshop will likely be planned for late May. For more information, contact Cynthia or Lynn.

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

Department of Ecology appoints Special Assistant for Climate Change
[excerpt from Maia Bellon's (Director of Ecology) email announcement] – "I am pleased to announce the appointment of Hedia Adelsman as my new Special Assistant for climate change. Reducing and preparing for climate change is one my four strategic priorities that Hedia will now lead and coordinate within the Department of Ecology. Hedia will work with me, Governor Inslee and his staff as we move Washington state forward to meet the challenges of climate change. She will continue working with Ecology's programs on climate change mitigation and adaptation and with Ecology's water programs on ocean acidification."

LEARNING OPPORTUNITIES

March 5th, 2014, 3:30-5:00 pm Pacific time, "Attribution of Extreme Weather"
The "Climate Conversations" Webinar series will present NOAA scientists Dr. Stephanie Herring and Dr. Martin Hoerling to discuss attribution of extreme weather and its connection with climate change. The

presentation will address questions such as: are extreme weather events a result of a changing climate?How do scientists attribute an extreme weather event or a trend? Why is it important to understand the attribution of single events and trends?
Register for the Webinar »

March 5th, 10:00-11:00 Pacific Time, Webinar "
Exploratory Scenario Planning for Large Landscape Conservation"
Speakers Joe Marlow of Sonoran Institute, Stephen Aldrich of Bio-Era and Kent Redford of Archipelago Consulting will discuss scenario planning as a vital tool that will help stakeholders make decisions in light of an uncertain future.
Click here for more information.

March 12th, 11:0-12:00 Pacific time, Webinar, "Expanding living shorelines within the National Estuarine Research Reserve (NERR) to protect habitat and to reduce climate change vulnerability through the application of collaborative science-based habitat restoration,"Dr. Peter Kingsley-Smith, South Carolina DNR.
Description: In the summer of 2012 the South Carolina Department of Natural Resources (SCDNR) acquired a 2-year Federal grant to address the problem of shoreline loss through erosional processes that are likely to be exacerbated under scenarios of future global climate change-driven sea level rise. This presentation will highlight stakeholder involvement, site selection processes, reef building achievements and challenges in year 1 and an outline of planned events for the months to come.
To register click here.

March 18th, 9:00-11:00 AM, Pacific Time, "Climate Management and Habitat Project Webinar", presented by the Institute for Natural Resources
This webinar presents findings from a study in Coastal Washington that explored potential effects of climate change and land management on Northern Spotted Owl habitat. This work was funded by the Washington Department of Natural Resources and the USGS NW Climate Science Center. This project builds on the work of the Integrated Landscape Assessment Project (ILAP). Please join us for a close-out webinar/meeting on Tuesday, March 18, from 9 am to 11 am Pacific time to learn about the landscape-level modeling results for different management and climate scenarios. Project contact: Jessica Halofsky, Research Ecologist, Institute for Natural Resources, Oregon State University, Portland, OR. Jhalo@uw.edu
Reserve your Webinar seat now at: https://www3.gotomeeting.com/register/948393998

April 17-18, 2014 , A workshop to introduce New Climate and Hydrologic modeling results for the Pacific Northwest
The "integrated scenarios of the future environment" project, funded by the NW Climate Science Center and the NOAA-funded Climate Impacts Research Consortium will be released in April. The project has evaluated and downscaled the most recent generation of global climate models for the northwest, examined their projections, and improved and applied hydrologic and vegetation models. A 1.5-day workshop will be held in Portland on April 17 and 18 to give an overview of project results including our best estimates of what the future will look like in the region; provide detailed instructions on how to access the digital data and solicit input on next steps for making these scenarios more useable. More details (including webcasting) at OCCRI. See related *Nature Climate Change article* that emphasizes integrated approaches: ***Making the most of climate impacts ensembles***

Sept 9-10, 2014, Seattle, WA, **Fifth Annual Pacific Northwest Climate Science Conference,**
http://pnwclimateconference.org/

The PNW Climate Science Conference annually brings together more than 250 researchers and practitioners from around the region to discuss scientific results, challenges, and solutions related to the impacts of climate on people, natural resources, and infrastructure in the Pacific Northwest. Emphasis is on talks that are comprehensible to a wide audience on topics of broad interest. Stay tuned for further details regarding abstract submission, registration, and program news. In the meantime, please contact Lara Whitely Binder (lwb123@uw.edu) with any questions about the conference.

WEBINARS AVAILABLE ONLINE

Climate Change Effects on Pacific Northwest Ecosystems Webinar Now Available Online

Last month the NPLCC hosted a webinar lead by Dr. Maureen Ryan of Simon Frasier University. The webinar covered an NPLCC-funded project which looked at how climate change might affect montane wetlands. The goal of the project was to develop hydrologic projections for wetland habitats such as forest wetlands, wet meadows, small ponds and riparian wetlands to help managers understand which wetlands might be at risk under current climate projections. If you were unable to make the webinar, it is now available for viewing on our brand new YouTube pageYou can view the webinar here and we encourage you to share the video with anyone who may be interested.

RESOURCES

Dan Isaak's Climate-Aquatics Blog #54

Managing with climate change: Goal setting & decision support tools for climate-smart prioritization (pdf attached).

Coastal Resilience Planning Tools

The Nature Conservancy is hosting a web site that provides potentially useful tools for coastal resilience planning, with global warming effects in mind. As it happens, they've targeted the Salish Sea (U.S. West Coast - Puget Sound) as one of their study areas.
http://maps.coastalresilience.org/network/

North Pacific Landscape Conservation Cooperative: Final Report on Climate Change and Terrestrial Ecosystems, Habitats, and Species

A new report prepared by National Wildlife Federation, Climate Change Effects and Adaptation Approaches for Terrestrial Ecosystems, Habitats, and Species, is now available. Funded by the NPLCC in 2012, this report is the third and final report about climate change effects on marine and coastal, freshwater, and terrestrial ecosystems in the geographic extent of the NPLCC. The reports provide the first ever compilation of climate related scientific literature for the entire NPLCC. A document with the combined executive summaries for the three reports is available here. The full marine and coastal and the freshwater reports are available on the **NPLCC website resources page.**

Global Warming Frequently Asked Questions

NOAA Climate.gov recently published a highly readable and easily scanned article of Frequently Asked Questions on Global Warming. The plain-language answers to commonly asked questions were vetted by a panel of climate scientists, and each answer is connected to references in the scientific literature.
The article offers scientifically accurate responses to many of the myths and misconceptions about climate that circulate in emails or via social media. For instance, the article answers questions such as "Don't volcanoes emit more carbon dioxide than humans?" and "Didn't global warming stop after 1998?"
Read the Article »

NOAA Hosts Monthly Webinar Series on Climate Information for Managing Risks in Water Resources

Working with collaborators such as the U.S. National Integrated Drought Information System, Water Research Foundation, Water Environment Federation, Water Environment Research Foundation, and American Water Works Association, the Sectoral Applications Research Program in NOAA's Climate Program Office is hosting a series of webinars the third Thursday of every month. For a listing of webinars, visit this site.

"Navigating Change: Hawai'i's Approach to Adaptation"

As the most geographically isolated islands on Earth, Hawai'i is especially vulnerable to the impacts of climate change. It is dependent on rainfall for freshwater, its coastlines are vulnerable to sea level rise, and rising ocean temperatures and acidification are impacting reefs and fisheries. This report describes the State of Hawai'i's unique position and perspective as a member of the President's State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience. **Download the report »**

Climate Change and Ecological Restoration

As evidence mounts of the scope of climate change and its varied impacts on the world, it makes sense to consider its impact on ecological restoration projects. It is not always clear how best to accomplish this. Join the conversation: Let us know your thoughts by joining in on Society for Ecological Restoration's LinkedIn group!

CLIMATE SCIENCE NEWS

Climate Change: Unstable Atlantic Deep Ocean Circulation May Hasten 'Tipping Point'

(from Science Daily) A new study looking at past climate change asks if these changes in the future will be spasmodic and abrupt rather than a more gradual increase in the temperature. Today, deep waters formed in the northern North Atlantic fill approximately half of the deep ocean globally. In the process, this impacts the circum-Atlantic climate and regional sea level, and soaks up much of the excess atmospheric carbon dioxide from industrialisation -- helping moderate the effects of global warming. Changes in this circulation mode are considered a potential tipping point in future climate change that could have widespread and long-lasting impacts including on regional sea level, the intensity and pacing of Sahel droughts, and the pattern and rate of ocean acidification and CO_2 sequestration. *full story*

Cyclones and frost: Two climate change myths debunked

(from Science Daily) Scientists have debunked two big myths around climate change by proving firstly, that despite predictions, tropical storms are not increasing in number. However, they are shifting, and South Africa could be at increased risk of being directly impacted by tropical cyclones within the next 40 years. Secondly, while global warming is causing frost to be less severe, late season frost is not receding as quickly as flowering is advancing, resulting in increased frost risk which will likely begin to threaten food security. *full story*

SPECIES AND HABITATS

Columbia Gorge Pikas Adapt by Eating Moss

Animals, especially mammals, that are closely tied to a specific habitat are perhaps most vulnerable in a changing climate. The American pika is a leading example. In the Great Basin, these small mammals, which

typically live at high elevation in areas with little vegetation and lots of loose rocks, or “talus." For pikas, high temperatures can be lethal, which helps explain why those in the Great Basin have been disappearing or moving upslope to avoid high temperatures. There is, however, a notable exception to the pikas’ preference for high-elevation talus fields: a population that lives near sea level in Oregon’s Columbia River Gorge. Johanna Varner and Denise Dearing have found that these pikas exhibit more flexible and adaptive behaviors than their high-elevation relatives. Take food, for instance. While most pikas eat small flowering plants called forbs and small grassy plants called “graminoids,” Columbia Gorge pikas consume less than 25 percent forbs and graminoids. Instead, they eat moss — lots of it. Understanding the ability of a species to adapt to novel habitats is crucial to understanding its vulnerability to climate change, and developing appropriate management and conservation plans.

Varner, J., and Dearing, M. D., 2014, Dietary plasticity in pikas as a strategy for atypical resource landscapes, *Journal of Mammalogy*, 95, 1, 72–81, doi: 10.1644/13-MAMM-A-099.1, http://www.bioone.org/doi/full/10.1644/13-MAMM-A-099.1.

Related article:

Beever et al., 2011, Contemporary climate change alters the pace and drivers of extinction, *Global Change Biology*, doi: 10.1111/j.1365-2486.2010.02389.x, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2010.02389.x/abstract.

A walk on the tundra: host parasite relationships in an extreme environment, *Kutz et al, International Journal for Parasitology*

(excerpt from the abstract): Climate change is occurring very rapidly in the Arctic, and the processes that have taken millions of years to evolve in this very extreme environment are now changing on timescales as short as decades. These changes are dramatic, subtle and non-linear. In this article, we discuss the evolving insights into host–parasite interactions for wild ungulate species, specifically, muskoxen and caribou, in the North American Arctic. These interactions occur in an environment that is characterized by extremes in temperature, high seasonality, and low host species abundance and diversity. We believe that lessons learned in this system can guide wildlife management and conservation throughout the Arctic, and can also be generalized to more broadly understand host–parasite interactions elsewhere. 2014 The Authors. Published by Elsevier Ltd. (article attached).

10 million scallops are dead; Qualicum company lays off staff

(excerpt from article by John Harding, Parksville Qualicum News)

Island Scallops in Qualicum Bay said it has suffered $10 million in losses because of high acidity levels in the Georgia Strait. High acid levels in the waters around Parksville Qualicum Beach have killed 10 million scallops and forced a local shellfish producer to scale operations back considerably. Island Scallops CEO Rob Saunders said the company has lost three years worth of scallops and $10 million. More here.

Proposals for a working group on the implications of climate change effects on Greater sage-grouse and sagebrush habitat in the semi-arid west

The DOI Climate Science Centers and the USGS Ecosystems Mission Area are interested in promoting synthesis activities surrounding questions about the implications of climate change effects on Greater sage-grouse and sagebrush habitat in the semi-arid west. They are coordinating with the Powell Center to provide funding for a Working Group on this topic. A working group would synthesize existing climate science as it relates to Greater sage-grouse and the sagebrush habitat that supports the species with a consideration for how climate change may be altering the sagebrush ecosystem. We encourage teams of scientists working at the intersection of climate science and sage brush/sage grouse to consider developing a Powell Center Working Group proposal related to this topic. Information pertaining to the Powell Center can be found at powellcenter.usgs.gov. The deadline for proposals is **April 30** for Working Groups starting in

FY15. All Powell Center Working Group proposals will be reviewed by the Science Advisory Board. Please refer questions to Jill Baron or Marty Goldhaber (jill_baron@usgs.gov, mgold@usgs.gov).
To view this announcement online, please visit https://nccwsc.usgs.gov/content/powell-center-funding-opportunity-research-sage-grouse .

Coastal Blue Carbon Opportunity Assessment For Snohomish Estuary : Climate Benefits Of Estuary Restoration

When coastal wetlands are drained and converted to terrestrial land uses, carbon is rapidly released back to the atmosphere in the form of carbon dioxide. Restoring coastal wetlands stops the drainage-induced releases of carbon and reactivates carbon sequestration. This new report from Restore America's Estuaries (RAE) discusses the methods, approach, findings, and recommended next steps for the Snohomish Estuary as a model for improved management of coastal wetlands for climate change mitigation benefits.

Climate change causes high but predictable extinction risks

(from Science Daily) Judging the effects of climate change on extinction may be easier than previously thought, according to a paper entitled, "Life history and spatial traits predict extinction risk due to climate change," published today in the journal Nature Climate Change. Although widely used assessments of threatened species, such as the IUCN Red List, were not developed with the effects of climate change in mind, a study of 36 amphibian and reptile species endemic to the US has concluded that climate change may not be fundamentally different from other extinction threats in terms of identifying species in danger of extinction.

Extreme Weather Caused by Climate Change Decides Distribution of Insects, Study Shows

(from Science Daily) Extreme weather caused by climate change in the coming decades is likely to have profound implications for distributions of insects and other invertebrates. This is suggested by a new study of insects in tropical and temperate regions of Australia. Predictions are that some species would disappear entirely in the next few decades, even when they have a fairly wide distribution that currently covers hundreds of kilometers. *full story*

Reassessing regime shifts in the North Pacific: incremental climate change and commercial fishing are necessary for explaining decadal-scale biological variability

In areas of the North Pacific that are largely free of overfishing, climate regime shifts – abrupt changes in modes of low-frequency climate variability – are seen as the dominant drivers of decadal-scale ecological variability…. However these findings suggest that, even in the absence of overfishing and in areas strongly influenced by internal climate variability, climate regime shift effects can only be understood in the context of other ecosystem perturbations (such as commercial fishery catches). *(Litzow, M. A., Mueter, F. J. and Hobday, A. J. (2014), Reassessing regime shifts in the North Pacific: incremental climate change and commercial fishing are necessary for explaining decadal-scale biological variability. Global Change Biology, 20: 38–50. doi: 10.1111/gcb.12373)*

Community composition has greater impact on the functioning of marine phytoplankton communities than ocean acidification

Ecosystem functioning is simultaneously affected by changes in community composition and environmental change such as increasing atmospheric carbon dioxide (CO_2) and subsequent ocean acidification. However, it largely remains uncertain how the effects of these factors compare to each other.... This study highlights the relevance of initial community composition, which strongly drives the functional outcome, when assessing impacts of climate change on ecosystem functioning. In particular, the increase in phytoplankton biomass driven by the gain of larger sized diatoms in response to elevated CO_2 potentially has strong implications for nutrient cycling and carbon export in future oceans. *(Eggers, S. L., Lewandowska, A. M.,*

Barcelos e Ramos, J., Blanco-Ameijeiras, S., Gallo, F. and Matthiessen, B. (2014), Community composition has greater impact on the functioning of marine phytoplankton communities than ocean acidification. Global Change Biology, 20: 713–723. doi: 10.1111/gcb.12421)

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

The Center for Climate and Energy Solutions (C2ES) maintains a page on their website dedicated to mapping state and regional climate actions in the United States. On this page, users can view maps by different sectors, including maps on **Climate Action Plans** and **Climate Adaptation Plans and Local Actions**. The adaptation map shows how cities and states are adapting (or becoming more resilient) to their individual vulnerabilities. It highlights examples of municipal adaptation planning efforts and concrete adaptation actions. It also indicates the status of adaptation planning for each state, and provides plan details where available.